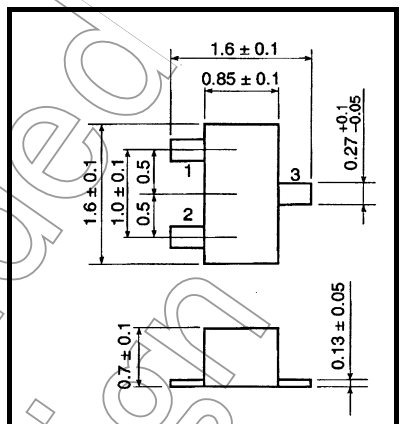
TOSHIBA Field Effect Transistor Silicon N Channel MOS Type

SSM3K04FE

High Speed Switching Applications

- With built-in gate-source resistor: R_{GS} = 1 MΩ (typ.)
- 2.5 V gate drive
- Low gate threshold voltage: V_{th} = 0.7~1.3 V
- Small package

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-2HA1B

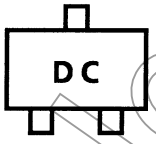
Weight: 2.3 mg (typ.)

Absolute Maximum Ratings (Ta = 25°C)

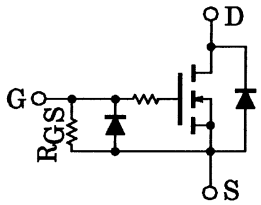
Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DS}	20	V
Gate-source voltage	V_{GSS}	10	V
DC drain current	I_D	100	mA
Drain power dissipation	P_D	100	mW
Channel temperature	T_{ch}	150	°C
Storage temperature range	T_{stg}	−55~150	°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Marking



Equivalent Circuit

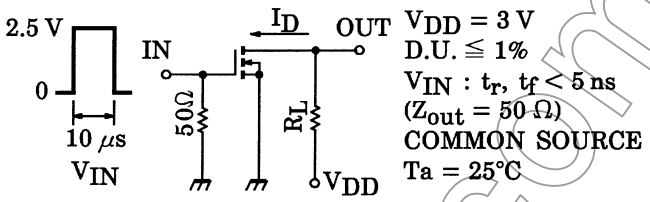


Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = 10 V, V_{DS} = 0	—	—	15	μA
Drain-source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 100 μA, V_{GS} = 0	20	—	—	V
Drain cut-off current		I_{DSS}	V_{DS} = 20 V, V_{GS} = 0	—	—	1	μA
Gate threshold voltage		V_{th}	V_{DS} = 3 V, I_D = 0.1 mA	0.7	—	1.3	V
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 3 V, I_D = 10 mA	25	50	—	mS
Drain-source ON resistance		$R_{DS\ (ON)}$	I_D = 10 mA, V_{GS} = 2.5 V	—	4	12	Ω
Input capacitance		C_{iss}	V_{DS} = 3 V, V_{GS} = 0, f = 1 MHz	—	11.0	—	pF
Reverse transfer capacitance		C_{rss}	V_{DS} = 3 V, V_{GS} = 0, f = 1 MHz	—	3.3	—	pF
Output capacitance		C_{oss}	V_{DS} = 3 V, V_{GS} = 0, f = 1 MHz	—	9.3	—	pF
Switching time	Turn-on time	t_{on}	V_{DD} = 3 V, I_D = 10 mA, V_{GS} = 0~2.5 V	—	0.16	—	μs
	Turn-off time	t_{off}	V_{DD} = 3 V, I_D = 10 mA, V_{GS} = 0~2.5 V	—	0.19	—	
Gate-source resistor		R_{GS}	V_{GS} = 0~10 V	0.7	1.0	1.3	MΩ

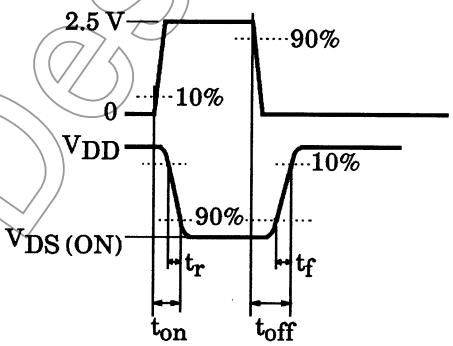
Switching Time Test Circuit

(a) Test circuit

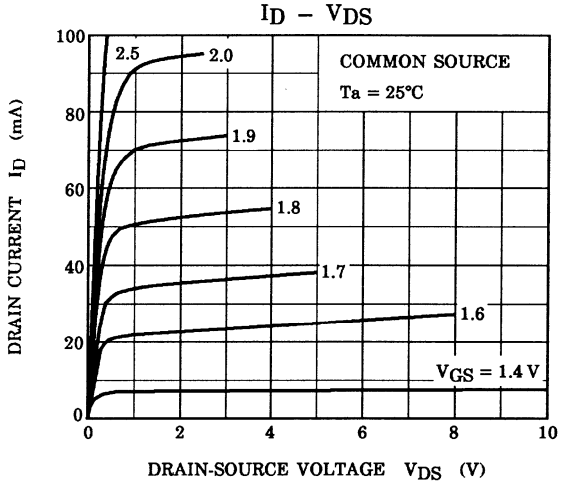


(b) V_{IN}
V_{GS}

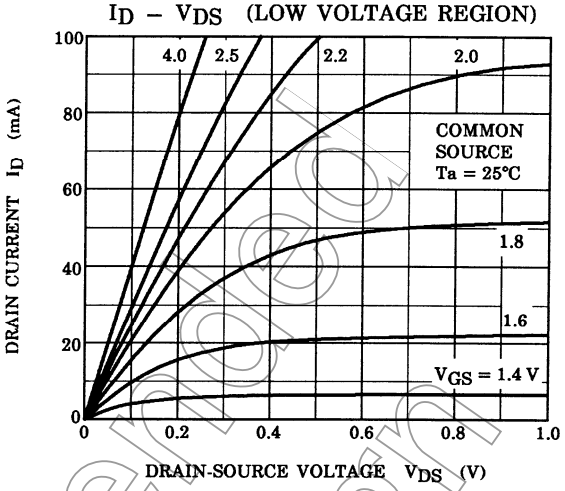
(c) V_{OUT}
V_{DS}



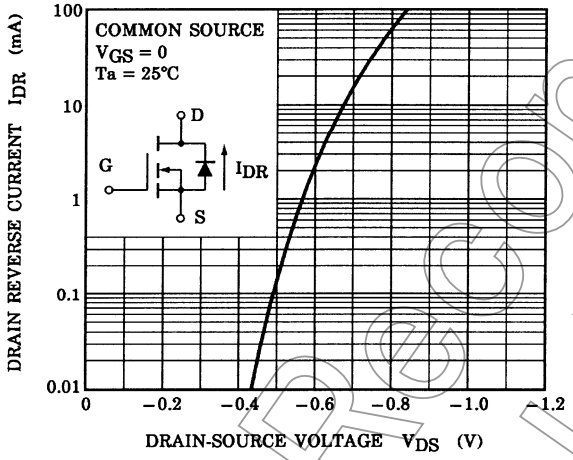
I_D – V_{DS}



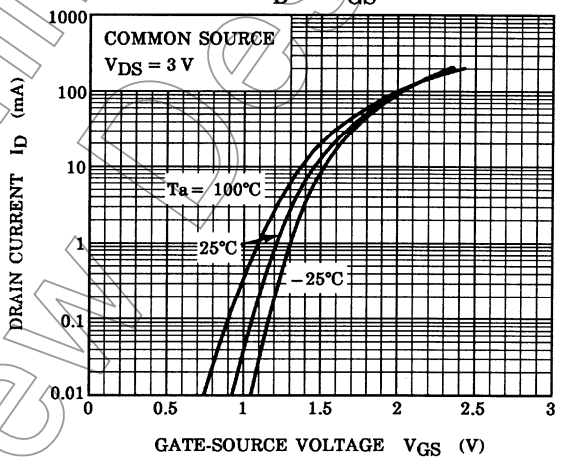
I_D – V_{DS} (LOW VOLTAGE REGION)



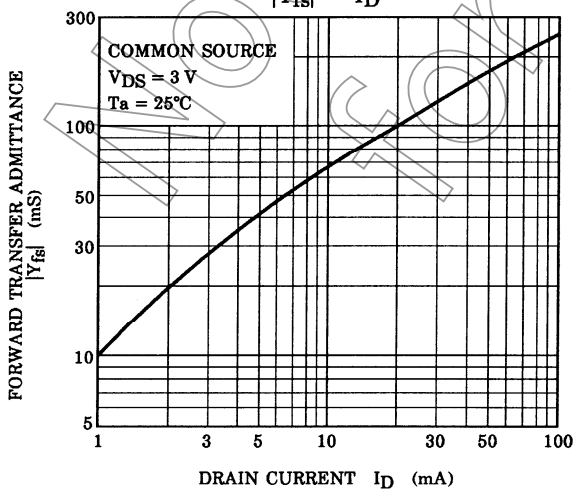
I_{DR} – V_{DS}



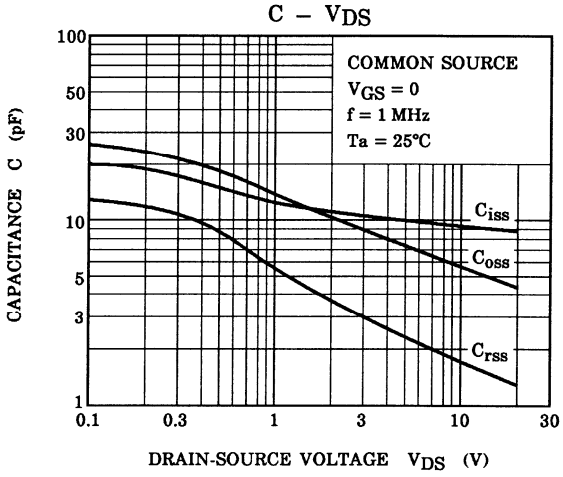
I_D – V_{GS}



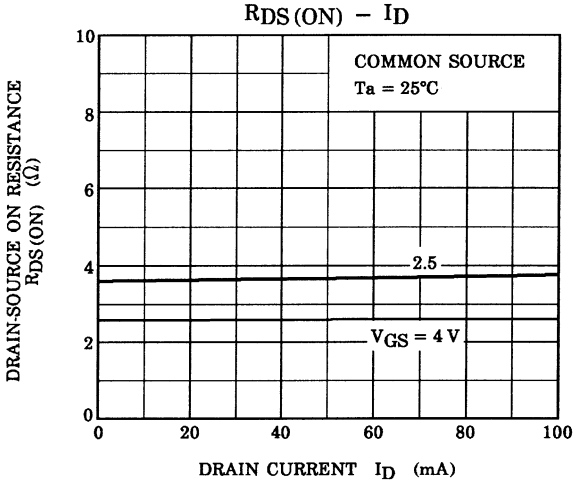
$|Y_{fs}|$ – I_D



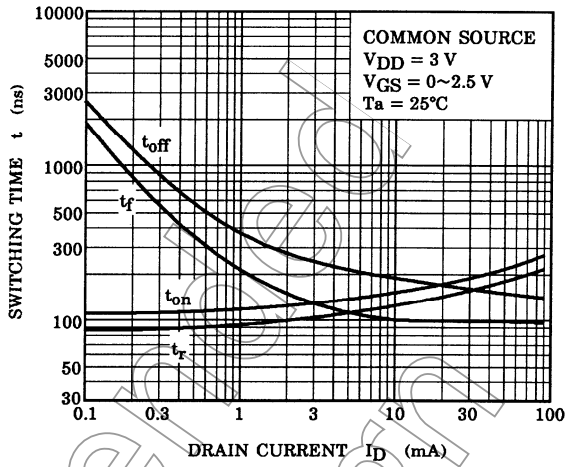
C – V_{DS}



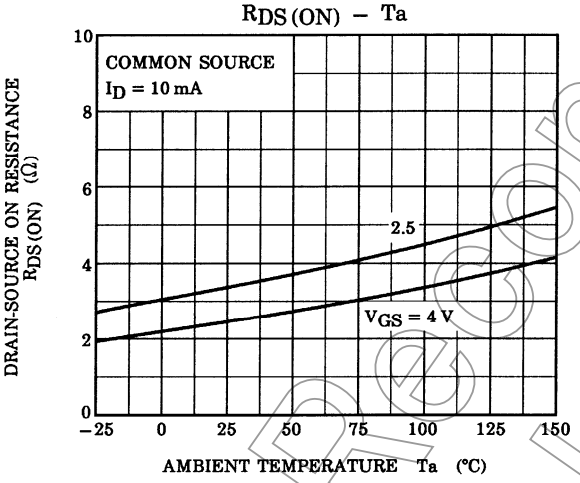
$R_{DS\,(ON)}$ – I_D



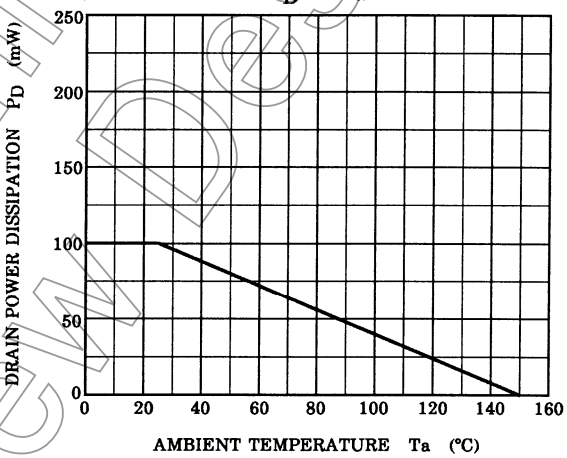
t – I_D



$R_{DS\,(ON)}$ – Ta



P_D – Ta



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